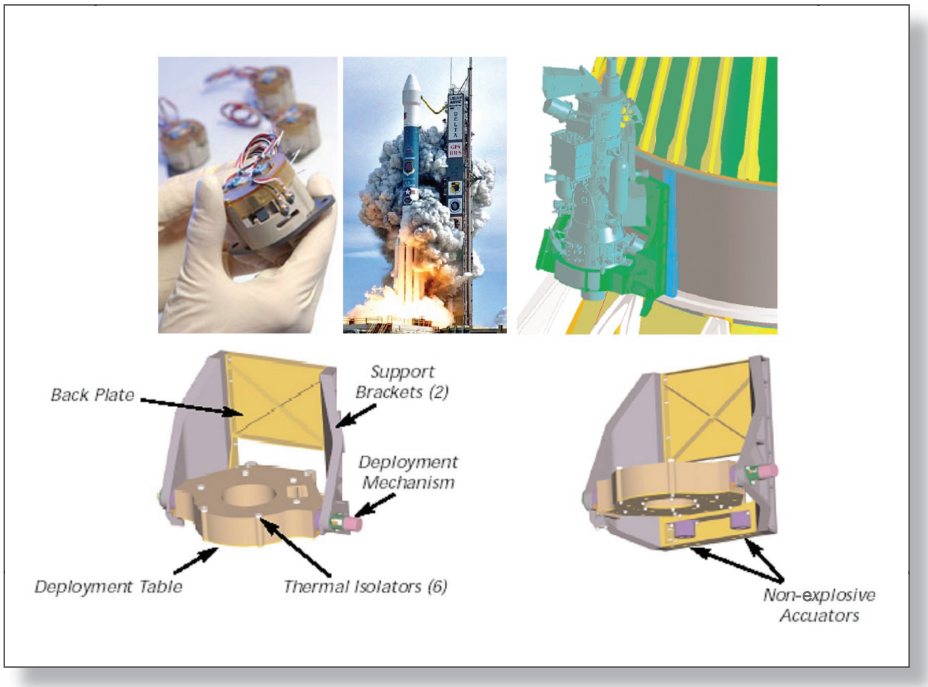
Air Force Research Laboratory|AFRL

Science and Technology for Tomorrow's Air and Space Force

Air Force SBIR/STTR Celebrating 100 Years of Air & Space Innovation

Success Story

QWKNUT LOW-SHOCK SEPARATION DEVICE



Starsys Research Corporation Qwknut low-shock release devices were flown as part of the Delta-II/GPS 2R-8 mission. Scientists used them to deploy the Swales Aerospace Sconce Secondary Payload Platform to release the XSS-10 satellite.

The Starsys Research Qwknut system eliminates pyrotechnic safety concerns, is lightweight (under half a pound), has a 50% reduction in mass over current systems, and performs low-shock separation. A typical shock level for separation is under 150 g's, an order of magnitude lower than the thousands of g's imparted by traditional pyrotechnic release bolts.

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Accomplishment

The Space Vehicles Directorate and Starsys Research developed the Qwknut low-shock release technology under a Small Business Innovation Research contract. Swales Aerospace developed the Sconce Payload Platform for XSS-10 as an interface between the XSS-10 microsatellite and the Delta-II 2nd Stage, procuring Starsys Research Qwknuts for use as part of the system. Two Qwknuts were installed on the Sconce to hold the deployment table vertical for flight through the vibration-intense ascent. On-orbit and upon receiving an initiation command from the 2nd stage, the XSS-10 experiment "fired" the Qwknuts (in parallel) and rotated the deployment table outward, where it was released to begin its mission.

Background

The Starsys Research Qwknut is a fast-acting separation nut for release of loads up to 3,000 lbf. The Qwknut may be reset in under a minute by pushing an integral reset lever, allowing mission engineers to functionally test the same hardware that is to be flown. Its extremely fast release time, less than 35 milliseconds, is possible through redundant shape memory alloy triggers. The device responds to a standard pyrotechnic firing pulse, enabling retrofit for existing systems.

Space Vehicles
Emerging Technology

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (03-VS-25)